

Missouri Seat Belt Usage Survey  
for  
2015

Conducted for the Traffic & Highway Safety Division of the  
Missouri Department of Transportation  
by  
The Missouri Safety Center  
University of Central Missouri

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## EXECUTIVE SUMMARY

The National Highway Traffic Administration (NHTSA) issued a new Uniform Criteria for State Observational Surveys of Seat Belt Use, with the Final Rule being published in the Federal Register (Vol. 76, No. 63, Friday, April 1, 2011, Rules and Regulations, pp. 18042 – 10859). The Uniform Criteria were revised in an effort to standardize the requirements for the state-wide observing and reporting of seat belt use for drivers and right front-seat passengers. The new requirements contain numerous important changes to include: county selection based upon fatality-based exclusion criterion rather than the population-based criterion of the past, the use of a weighted calculation based upon several factors, a change in the standard error from 5.0 percent to 2.5 percent, and the involvement of a qualified statistician in the sampling design and annual reporting aspects of the survey. Missouri's methodology was approved by NHTSA March 29, 2013.

The following report documents the 2015 results of Missouri's annual state-wide seat belt use survey. The principal objective being to establish a seat belt usage rate of drivers and right front-seat passengers from which strategies targeting educational and enforcement occupant protection programs can be developed. Missouri's sampling plan addresses both the need for a state-wide seat belt usage rate (required by NHTSA) and a usage rate for each of the seven Missouri Department of Transportation (MoDOT) Districts. A regional coalition consisting of traffic safety experts exists within each of the seven MoDOT District's and is tasked with the development of a regionally based strategy to reduce crash-related fatalities. The ability to provide each regional coalition with a district seat belt use estimate would be helpful in the establishment of programs to improve seat belt use.

Missouri's observational survey of seat belt usage took place June 1<sup>st</sup> through June 14<sup>th</sup>, 2015. The Traffic and Highway Safety Division of MoDOT contracted with the Missouri Safety Center located at the University of Central Missouri to help develop, implement, and analyze the 2015 observational survey with the statistical expertise being provided by Dr. Donald N. Nimmer, Director Emeritus of Institutional Research at the University of Central Missouri.

*Based upon a total of 118,081 vehicle occupants observed, the 2015 seat belt use rate on Missouri roadways was found to be 79.9 percent with a standard error of 0.227. Of these 118,081 occupants, seat belt use could not be determined for 715 drivers and right front seat passengers. Therefore, the non-response or unknown use rate for the 715 occupants was 0.61 percent, and does not exceed the 10 percent requirement established by NHTSA.*

The 1998 seat belt use survey was done as the base line, then each survey after and up through the 2012 seat belt use survey was conducted as a replication of the former and all were probability based surveys with the data collection locations representative of 85 percent of the State's population and was, at that time, in compliance with the guidelines recommended by NHTSA. However, due to the changes in methodology required by NHTSA, the "Final Rule", and Missouri, the 2015 survey locations now account for 85 percent of the crash-related fatalities in the State, and for this reason the data collected in 2015 may not be entirely comparable to those data collected prior to 2013.

Table 1 indicates the weighted results of observations from 1998 through 2015.

**Table 1: Observations and Usage Rate by Year, 1998-2015**

<b>Year</b>	<b>Usage Rate</b>	<b>Vehicles Observed</b>	<b>Total Observation (Driver&amp; Passenger)</b>
2015	79.9%	91,463	118,081
2014	78.82%	90,015	117,297
2013	80.07%	82,128	108,096
2012	79.39%	92,860	119,474
2011	78.95%	97,646	127,720
2010	76.03%	96,160	126,419
2009	77.18%	94,799	122,962
2008	75.78%	88,980	116,274
2007	77.16%	87,543	114,432
2006	75.18%	90,345	117,901
2005	77.41%	82,051	105,233
2004	75.88%	85,066	111,966
2003	72.93%	83,781	109,619
2002	69.37%	75,412	99,099
2001	67.91%	73,603	97,544
2000	67.72%	70,230	92,000
1999	60.8%	74,058	95,538
1998	60.4%	74,930	97,233

# TABLE OF CONTENTS

# PAGE

<b>EXECUTIVE SUMMARY .....</b>	<b>i</b>
<b>METHODOLOGY .....</b>	<b>1</b>
County Selection	
Roadway Classification and Segment Selection	
<b>DATA COLLECTION .....</b>	<b>2</b>
Observers and Quality Control Monitors	
Observation and Survey Protocols	
<b>RESULTS .....</b>	<b>4</b>
Weighted vs. Un-weighted Estimations	
<b>STATE-WIDE RESULTS.....</b>	<b>4</b>
Weighted Data	
Un-weighted Data	

## **TABLES**

## **PAGE**

1	Observations and Usage Rate by Year, 1998-2014.....	ii
2	State-wide, Seat Belt Use in Missouri .....	5
3	State-wide, Belt Use by MoDOT District .....	5
4	State-wide, Belt Use by Roadway Type.....	6
5	State-wide, Belt Use by Vehicle Occupant .....	7
6	State-wide, Belt Use by MoDOT District .....	7
7	State-wide, Driver & Passenger Belt Use by Roadway Classification .....	8
8	State-wide, Drivers Belt Use by Vehicle Type .....	8
9	State-wide, Drivers Belt Use by Gender .....	9
10	State-wide, Drivers & Passenger Belt Use by Day of the Week.....	9
11	State-wide, Vehicles Observed by Time of Day .....	10
12	State-wide, Vehicles Observed by Direction of Traffic Flow.....	10
13	State-wide, Vehicles Observed by Road Conditions .....	11

## **APPENDICES**

## **PAGE**

A	Vehicle Occupants Fatalities by County, 2008-2010.....	12
B	Top Counties with 85% of Vehicle Occupant Fatalities, 2008-2010.....	15
C	Road Segment by Functional Road Type by MoDOT District .....	16
D	Site Summary Form .....	19
E	Observation Form .....	20

# **METHODOLOGY**

## **County Selection**

The State of Missouri is comprised of 114 counties and the City of St. Louis. For the purpose of this study the city of St. Louis and the County of St. Louis have been combined and have been counted as a single county. A total of 63 counties account for 85 percent of the total fatalities from 2008 – 2010 and these represent the primary sampling unit (PSU). The fatality data are reported by county, in descending order of magnitude, in Appendix A, Vehicle Occupant Fatalities by County 2008-2010.

The need for both a state and MoDOT District seat belt use rate is the basis for the utilization of a multi-stage stratification sampling design. The 63 counties were first categorized by urbanicity (urban-population over 50,000 and rural-fewer than 50,000) and then by their respective MoDOT District (Northwest, Northeast, Kansas City, Central, St. Louis, Southwest and Southeast). The boundaries of these districts and the counties which lie therein are illustrated on the map in Appendix B, Top Counties with 85% of Vehicle Occupant Fatalities 2008-2010. It was further determined that two urban and two rural counties were desired for each MoDOT District which, when feasible were randomly selected. The weighting assignment of each county for this random selection process was based upon the percent of vehicle miles traveled (VMT). However, an adjustment was made to both the Northwest and Northeast District's as only one urban county was available and an adjustment was made to the St. Louis District where there were no rural counties available for selection. As a result of this process 28 counties were selected for inclusion in the survey of seat belt use in Missouri.

## **Roadway Classification and Segment Selection**

Twenty roadway segments (sites) were selected in each of the 28 survey counties for a total of 560 sites; that selection was based upon eight functional road classifications identified by MoDOT (Urban Interstate, Urban Freeway/Expressway, Urban Arterial, Urban Collector, Rural Interstate, Rural Freeway/Expressway, Rural Arterial, and Rural Collector) and their relative Daily Vehicle Miles Traveled (DVMT).

The target stratification proportions for each of the 28 survey counties and the corresponding 20 Road Segments by Functional Road Type are reported by MoDOT District in Appendix C.

## **DATA COLLECTION**

### **Observers and Quality Control Monitors**

A total of 45 observers were hired and trained by the Missouri Safety Center. All but four of the observers were experienced data collectors who had conducted seat belt observations in past surveys. The four newly hired surveyors received additional and individual training from the Missouri Safety Center.

All data collectors (observers) and quality control monitors were trained in the appropriate procedures of Missouri's survey. Data collection protocols, scheduling, site locations, field protocols and reporting requirements were all topics covered during the training. Additionally, observers were instructed on how to proceed in conditions of bad weather or temporary traffic impediments, as well as, if an observation site needed to be abandoned due to construction activities, safety concerns, or some other legitimate reason.

The Quality Control (QC) Monitors were given additional training that focused on their specific duties. These duties included verifying that the observers were at the appropriate observation site during the assigned time, ensuring that the observers were following field protocol and offering assistance if needed. Six quality control monitors were utilized to conduct random unannounced visits to 74 of the total 560 observation sites. This represents a 13 percent monitoring rate which is well above the 5 percent rate required by NHTSA.

### **Observation and Survey Protocols**

Observation sites were geographically organized into clusters of 3, 4, or 5 sites to facilitate a reasonable driving time between locations. Each cluster was randomly assigned a single day of the week for the observation to take place. The sites within the cluster were then randomly assigned an observation period of time.

Two observers were required to work together at each observational site; one to articulate the observations for each vehicle while the other would record the observations. Each observer was given a survey schedule and a detailed map of site locations for their respective observational counties. The survey schedule specified the site number (both primary and alternate), survey route, referenced intersection, week day, start time, MoDOT District, and road type. Using the identified referenced intersection listed on the survey schedule, the observer was given the discretion to use their best judgment to select the safest location to conduct the survey. Observers recorded data from one lane (outermost or far-right lane) and one direction of travel per survey location. The observations were conducted on all days of the week during daylight hours between 7:00 a.m. and 6:00 p.m. Observations started at the predetermined assigned time and continue for exactly 45-minutes.

Observations were made and use, non-use or unknown use of seat belts was recorded for all drivers and front-seat outboard passengers including children riding in booster seats (excluding children in child safety seats). If there was no passenger in the right front-seat of an observed vehicle then the passenger field was left blank on the data collection form. Passenger cars, van/minivan, sport utility/crossover vehicles, pickup trucks and commercial vehicles weighing less than 10,000 pounds are all qualifying vehicles for the survey and are eligible for observation, regardless of the license state. The additional data element of driver gender was also collected and recorded. All these data were recorded on the Site Summary Form (Appendix D) and Observation Form (Appendix E).



## RESULTS

### Weighted vs. Un-weighted Estimations

Information recorded using the Site Summary and Observation Forms represent each vehicle observed. This information is considered to be raw or *un-weighted* data. While it might appear that using such information is the most direct and easiest to understand, it is often misleading when one considers that the observations on some road segments included every vehicle during the specified time period while significantly fewer vehicles were counted on other road segments. That is, all vehicles were counted on most two lane roads but it will not be true of multi-lane roadways where the observers included only those vehicles in the outer most right hand lane and/or, if the traffic was heavy, and recorded perhaps every third vehicle. For example, the St. Louis District comprised of primarily busy multi-lane roadways had observations totaling 18,991 vehicles at its 20 sites, while the Southwest and Southeast Districts each had nearly the same number of observations for their 20 sites but included a higher proportion of 2-lane roads. It is apparent that the data observed for the St. Louis District represent far more vehicles than do the data for the Southwest and Southeast Districts. This was compensated by considering the greater DVMT represented in the St. Louis District as compared to the Southwest and Southeast District resulting in a *weighted* estimation. Similarly, DVMT was used for selecting counties and observation sites by the eight functional road classifications resulting in further weighting of the estimations. NHTSA requires the estimations of seat belt use to be calculated using weighted data; this was done in Missouri using the specifications described in the approved observational plan. Each of the following sections will be identified as containing either weighted or un-weighted data.

## STATE-WIDE RESULTS

Observers recorded data from 560 sites within the 28 Missouri counties on 118,081 vehicle occupants of whom 91,463 were drivers and 26,618 were outboard front seat passengers; of these, belt use was unknown for 715 vehicle occupants.

### *Weighted Data*

Tables 2-4, show only weighted data and include the relative weights of the DVMT; however they do exclude the unknowns (715 vehicle occupants).

The overall belt use rate for drivers and passengers combined is 79.9 percent (95 Percent Confidence Interval 79.7% - 80.1%). Table 2 shows the 2015 Seat Belt Use in Missouri.

**Table 2: State-wide, Seat Belt Use in Missouri**

<b>Belt Use</b>	<b>Frequency</b>	<b>Percent</b>	<b>Standard Error of Percent</b>
<b>Belted</b>	94,118	79.9	0.227
<b>Non-Belted</b>	23,248	20.1	0.227
<b>Total</b>	117,366	100.0	

The 2015 survey sampling plan separates the state into seven MoDOT Districts; the weighted seat belt use rates by district are shown in Table 3. The range of percent is from a low of 68.4 percent in the Kansas City District to a high of 88.1 percent in the Central District.

**Table 3: State-wide, Belt Use by MoDOT District**

<b>District</b>	<b>Percent Belted</b>
<b>Northwest</b>	82.6
<b>Northeast</b>	87.1
<b>Kansas City</b>	68.4
<b>Central</b>	88.1
<b>St. Louis</b>	80.4
<b>Southwest</b>	80.7
<b>Southeast</b>	84.0

Table 4 shows the overall vehicle occupant seat belt use by roadway type. Roadways are stratified using the eight functional roadway classifications of MoDOT. The roadway type Rural Interstate had the highest seat belt use whereas the roadway type Rural Collector had the lowest, at 86.7 and 60.2 percent respectively.

**Table 4: State-wide, Belt Use by Roadway Type**

<b>Roadway Type</b>	<b>Percent Belted</b>
<b>Rural Arterial</b>	80.6
<b>Rural Collector</b>	60.2
<b>Rural Freeway/Expressway</b>	80.1
<b>Rural Interstate</b>	86.5
<b>Urban Arterial</b>	71.1
<b>Urban Collector</b>	67.5
<b>Urban Freeway/Expressway</b>	80.2
<b>Urban Interstate</b>	75.8

### ***Un-weighted Data***

Tables 5-11 show only raw or un-weighted data and do not include the relative weights of the DVMT; they do include the unknowns (715 vehicle occupants). These numbers are not directly comparable to the weighted estimates.

Table 5 exhibits the un-weighted estimates of seat belt use by drivers (78.9%), passengers (82.3%), and overall (79.7%).

**Table 5: State-wide, Belt Usage by Vehicle Occupant\***

<b>Vehicle Occupant</b>	<b>Belted</b>		<b>Non-Belted</b>		<b>Unknown</b>	
	<b>Frequency</b>	<b>Percent</b>	<b>Frequency</b>	<b>Percent</b>	<b>Frequency</b>	<b>Percent</b>
<b>Drivers</b>	72,224	78.9	18,741	20.5	498	0.5
<b>Passengers</b>	21,894	82.3	4,507	16.9	217	0.8
<b>Overall</b>	94,118	79.7	23,248	19.7	715	0.6

\* Un-weighted Data

Table 6 distributes seat belt usage by MoDOT District. Usage varied from a low of 75.2 percent in the Northwest District to a high of 85.9 percent in the Central District.

**Table 6: State-wide, Belt Use by MoDOT District\***

<b>MoDOT District</b>	<b>Belted</b>		<b>Non-Belted</b>		<b>Unknown</b>		<b>Overall</b>	
	<b>Freq.</b>	<b>Percent</b>	<b>Freq.</b>	<b>Percent</b>	<b>Freq.</b>	<b>Percent</b>	<b>Freq.</b>	<b>Percent</b>
<b>Northwest</b>	9,370	75.2	3,009	24.1	88	0.7	12,467	10.6
<b>Northeast</b>	13,870	81.4	2,945	17.3	226	1.3	17,041	14.4
<b>Kansas City</b>	13,052	75.8	4,154	24.1	3	0.1	17,209	14.6
<b>Central</b>	19,373	85.9	3,046	13.5	141	0.6	22,560	19.1
<b>St. Louis</b>	15,361	80.9	3,615	19.0	15	0.1	18,991	16.0
<b>Southwest</b>	11,070	75.6	3,368	23.0	200	1.4	14,638	12.4
<b>Southeast</b>	12,022	79.2	3,111	20.5	42	0.3	15,175	12.9

\* Un-weighted data

Driver and Passenger seat belt use by roadway classification is displayed in Table 7 and shows that belt use was highest on Rural Interstate (86.1%). The lowest usage was recorded for the Rural Collector (60.5%) classification.

**Table 7: State-wide, Driver & Passenger Belt Use by Roadway Classification\***

Roadway Type	Belted		Non-Belted		Unknown		Overall	
	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent
<b>Rural Arterial</b>	11,044	77.3	3,146	22.0	97	0.7	14,287	12.1
<b>Rural Collector</b>	1,309	60.5	848	39.2	8	0.3	2,165	1.8
<b>Rural Freeway / Expressway</b>	8,744	79.6	2,128	19.4	109	1.0	10,981	9.3
<b>Rural Interstate</b>	33,516	86.1	5,106	13.2	289	0.7	38,911	33.0
<b>Urban Arterial</b>	12,649	69.4	5,464	30.0	120	0.6	18,233	15.4
<b>Urban Collector</b>	956	66.1	481	33.3	9	0.6	1,446	1.2
<b>Urban Freeway / Expressway</b>	12,242	82.6	2,519	17.0	62	0.4	14,823	12.6
<b>Urban Interstate</b>	13,658	79.3	3,556	20.6	21	0.1	17,235	14.6

\* Un-weighted data

The SUV had the highest seat belt usage for drivers at 85.4 percent, and trucks had the lowest seat belt usage at 66.1 percent. Table 8 shows seat belt use by drivers for vehicle type.

**Table 8: State-wide, Drivers Belt Use by Vehicle Type\***

Vehicle Type	Belted		Non-Belted		Unknown		Overall	
	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent
<b>Passenger Cars</b>	31,067	80.8	7,175	18.7	201	0.5	38,443	42.0
<b>Sport Utility/Crossover</b>	20,480	85.4	3,413	14.2	104	0.4	23,997	26.2
<b>Pickup Trucks</b>	13,450	66.1	6,754	33.2	159	0.7	20,363	22.3
<b>Van/Minivan</b>	72,224	83.4	1,399	16.2	34	0.4	8,660	9.5

\* Un-weighted data

An additional data element collected during the survey was that of Driver Gender. Table 9 provides the seat belt use estimation by driver gender. There were more male drivers 57,464 (62.8%) observed than female drivers 33,999 (37.2%).

**Table 9: State-wide, Driver Belt Use by Gender\***

Gender	Belted		Non-Belted		Unknown		Overall	
	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent
Female	28,509	83.9	5,352	15.7	138	0.4	33,999	37.2
Male	43,715	76.1	13,389	23.3	360	0.6	57,464	62.8

\*Un-weighted Data

The 2015 survey was scheduled and conducted over a fourteen day period (June 1<sup>st</sup> through 14<sup>th</sup>), between the hours of 7:00 am and 6:00 pm. Table 10 shows that of the 117,339 observations of both drivers and passengers. Thursday had the highest number of observations at 20,006.

**Table 10: State-wide, Driver & Passenger Belt Use by Day of the Week\***

Day of the Week	Belted		Non-Belted		Unknown		Overall	
	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent
Monday	8,894	80.1	2,063	18.6	153	1.3	11,110	9.5
Tuesday	13,541	80.7	3,135	18.7	114	0.6	16,790	14.3
Wednesday	13,838	78.3	3,781	21.4	52	0.3	17,671	15.1
Thursday	15,589	77.9	4,343	21.7	74	0.4	20,006	17.1
Friday	12,951	79.3	3,255	19.9	135	0.8	16,341	13.9
Saturday	14,996	82.4	3,114	17.1	83	0.5	18,193	15.5
Sunday	13,683	79.4	3,446	20.0	99	0.6	17,228	14.6

\* Un-weighted Data

Frequency Missing = 742

Tables 11, 12 and 13 display vehicles observed by time of the day, direction of traffic flow and conditions of the road.

**Table 11: State-wide, Vehicles Observed by Time of Day\***

<b>Time</b>	<b>Frequency</b>	<b>Percent</b>	<b>Cumulative Frequency</b>	<b>Cumulative Percent</b>
<b>7:00 am</b>	5,413	6.0	5413	6.0
<b>8:00 am</b>	6,453	7.1	11,866	13.1
<b>9:00 am</b>	6,597	7.3	18,463	20.4
<b>10:00 am</b>	8,477	9.3	26,940	29.7
<b>11:00 pm</b>	7,692	8.5	34,632	38.2
<b>12:00 pm</b>	9,875	10.9	44,507	49.1
<b>1:00 pm</b>	8,152	8.9	52,659	58.0
<b>2:00 pm</b>	9,589	10.6	62,248	68.6
<b>3:00 pm</b>	10,333	11.4	72,581	80.0
<b>4:00 pm</b>	10,586	11.6	83,167	91.6
<b>5:00 pm</b>	7,671	8.4	90,838	100.0

\*Un-weighted Data

Frequency Missing = 625

**Table 12: State-wide, Vehicles Observed by Direction of Traffic Flow\***

<b>Flow</b>	<b>Frequency</b>	<b>Percent</b>	<b>Cumulative Frequency</b>	<b>Cumulative Percent</b>
<b>East</b>	34,088	37.3	34,088	37.3
<b>North</b>	11,013	12.0	45,101	49.3
<b>South</b>	25,579	28.0	70,680	77.3
<b>West</b>	20,783	22.7	91,463	100.0

\*Un-weighted Data

It should be noted from Table 12 that the traffic flow of East has the highest observation percentage within the group at 37.3 percent.

**Table 13: State-wide, Vehicles Observed by Road Conditions\***

<b>Condition</b>	<b>Frequency</b>	<b>Percent</b>	<b>Cumulative Frequency</b>	<b>Cumulative Percent</b>
<b>Dry</b>	83,696	93.2	83,696	93.2
<b>Wet</b>	6,126	6.8	89,822	100.0
<b>Fog</b>	0	0.0	0	0
<b>Other</b>	0	0.0	0	0

\*Un-weighted Data

Frequency Missing = 1,641



# APPENDIXES

- A. Vehicle Occupants Fatalities by County, 2008-2010
- B. Top Counties with 85% of Vehicle Occupants Fatalities, 2008-2010
- C. Road Segment by Functional Road Type by MoDOT District.
- D. Site Summary Form
- E. Observational Form

**APPENDIX A**

**Vehicle Occupant Fatalities by County  
2008 - 2010**

County	2008-2010 Fatalities	3-year avg. Fatalities	% of Contribution	Accumulative Fatalities
JACKSON	161	53.67	7.82%	7.82%
ST. LOUIS	111	37.00	5.39%	13.20%
JEFFERSON	87	29.00	4.22%	17.43%
ST. LOUIS CITY	76	25.33	3.69%	21.12%
GREENE	68	22.67	3.30%	24.42%
ST. CHARLES	57	19.00	2.77%	27.18%
FRANKLIN	54	18.00	2.62%	29.81%
CLAY	51	17.00	2.48%	32.28%
NEWTON	41	13.67	1.99%	34.27%
BOONE	37	12.33	1.80%	36.07%
JASPER	36	12.00	1.75%	37.82%
PETTIS	31	10.33	1.50%	39.32%
ST. FRANCOIS	31	10.33	1.50%	40.83%
LAWRENCE	30	10.00	1.46%	42.28%
CALLAWAY	29	9.67	1.41%	43.69%
MILLER	29	9.67	1.41%	45.10%
CAMDEN	28	9.33	1.36%	46.46%
BARRY	27	9.00	1.31%	47.77%
BUTLER	27	9.00	1.31%	49.08%
COLE	27	9.00	1.31%	50.39%
HOWELL	27	9.00	1.31%	51.70%
WASHINGTON	27	9.00	1.31%	53.01%
CASS	25	8.33	1.21%	54.22%
NEW MADRID	25	8.33	1.21%	55.44%
WARREN	24	8.00	1.17%	56.60%
LACLEDE	21	7.00	1.02%	57.62%
PLATTE	21	7.00	1.02%	58.64%
SCOTT	21	7.00	1.02%	59.66%
LINCOLN	20	6.67	0.97%	60.63%
NODAWAY	20	6.67	0.97%	61.60%
BUCHANAN	19	6.33	0.92%	62.52%
DUNKLIN	19	6.33	0.92%	63.45%
PHELPS	19	6.33	0.92%	64.37%
ST. CLAIR	19	6.33	0.92%	65.29%
TEXAS	19	6.33	0.92%	66.21%
WAYNE	19	6.33	0.92%	67.14%
CHRISTIAN	18	6.00	0.87%	68.01%
MCDONALD	18	6.00	0.87%	68.88%
TANEY	18	6.00	0.87%	69.76%

PEMISCOT	17	5.67	0.83%	70.58%
JOHNSON	16	5.33	0.78%	71.36%
MORGAN	16	5.33	0.78%	72.14%
PULASKI	15	5.00	0.73%	72.86%
RIPLEY	15	5.00	0.73%	73.59%
STODDARD	15	5.00	0.73%	74.32%
WEBSTER	15	5.00	0.73%	75.05%
LAFAYETTE	14	4.67	0.68%	75.73%
AUDRAIN	13	4.33	0.63%	76.36%
BARTON	13	4.33	0.63%	76.99%
CAPE GIRARDEAU	13	4.33	0.63%	77.62%
DENT	13	4.33	0.63%	78.25%
MARION	13	4.33	0.63%	78.88%
POLK	13	4.33	0.63%	79.51%
STONE	13	4.33	0.63%	80.15%
BATES	12	4.00	0.58%	80.73%
CRAWFORD	12	4.00	0.58%	81.31%
GRUNDY	12	4.00	0.58%	81.89%
MONTGOMERY	12	4.00	0.58%	82.48%
RAY	12	4.00	0.58%	83.06%
ADAIR	11	3.67	0.53%	83.59%
HENRY	11	3.67	0.53%	84.13%
SALINE	11	3.67	0.53%	84.66%
VERNON	11	3.67	0.53%	85.19%
ANDREW	10	3.33	0.49%	85.68%
DALLAS	10	3.33	0.49%	86.17%
HICKORY	10	3.33	0.49%	86.65%
PIKE	10	3.33	0.49%	87.14%
CARTER	9	3.00	0.44%	87.57%
DOUGLAS	9	3.00	0.44%	88.01%
GASCONADE	9	3.00	0.44%	88.45%
MONROE	9	3.00	0.44%	88.88%
OSAGE	9	3.00	0.44%	89.32%
RANDOLPH	9	3.00	0.44%	89.76%
BENTON	8	2.67	0.39%	90.15%
CALDWELL	8	2.67	0.39%	90.53%
COOPER	8	2.67	0.39%	90.92%
DEKALB	8	2.67	0.39%	91.31%
IRON	8	2.67	0.39%	91.70%
MARIES	8	2.67	0.39%	92.09%
OREGON	8	2.67	0.39%	92.48%
OZARK	8	2.67	0.39%	92.86%
STE. GENEVIEVE	8	2.67	0.39%	93.25%
BOLLINGER	7	2.33	0.34%	93.59%
CEDAR	7	2.33	0.34%	93.93%
LINN	7	2.33	0.34%	94.27%
MISSISSIPPI	7	2.33	0.34%	94.61%

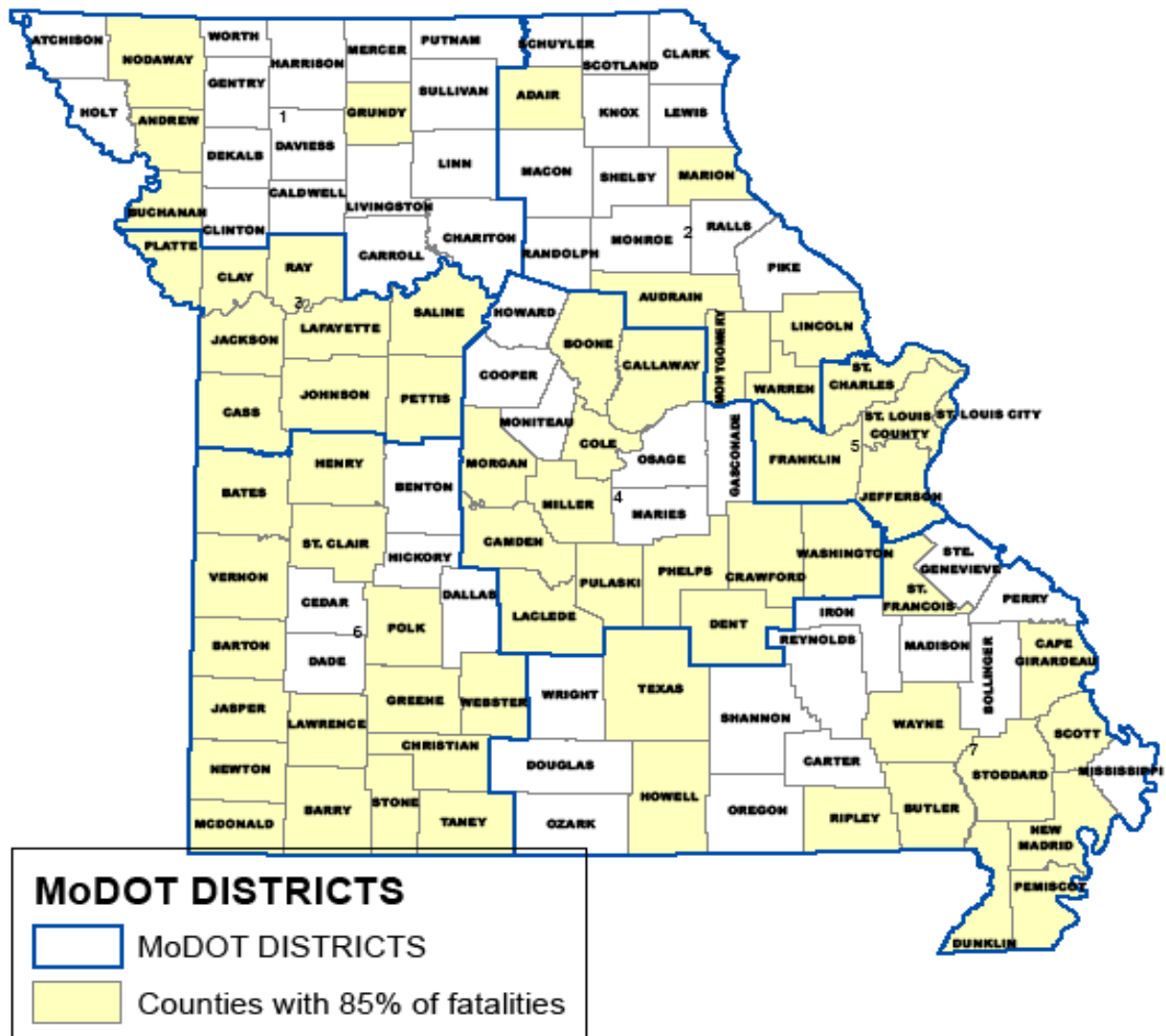
RALLS	7	2.33	0.34%	94.95%
SHANNON	7	2.33	0.34%	95.29%
DAVIESS	6	2.00	0.29%	95.58%
GENTRY	6	2.00	0.29%	95.87%
WRIGHT	6	2.00	0.29%	96.17%
CARROLL	5	1.67	0.24%	96.41%
CLINTON	5	1.67	0.24%	96.65%
DADE	5	1.67	0.24%	96.89%
HARRISON	5	1.67	0.24%	97.14%
MADISON	5	1.67	0.24%	97.38%
MONITEAU	5	1.67	0.24%	97.62%
PERRY	5	1.67	0.24%	97.86%
REYNOLDS	5	1.67	0.24%	98.11%
KNOX	4	1.33	0.19%	98.30%
LIVINGSTON	4	1.33	0.19%	98.50%
CLARK	3	1.00	0.15%	98.64%
HOWARD	3	1.00	0.15%	98.79%
MACON	3	1.00	0.15%	98.93%
SCOTLAND	3	1.00	0.15%	99.08%
SHELBY	3	1.00	0.15%	99.22%
CHARITON	2	0.67	0.10%	99.32%
HOLT	2	0.67	0.10%	99.42%
LEWIS	2	0.67	0.10%	99.51%
PUTNAM	2	0.67	0.10%	99.61%
SCHUYLER	2	0.67	0.10%	99.71%
SULLIVAN	2	0.67	0.10%	99.81%
WORTH	2	0.67	0.10%	99.90%
ATCHISON	1	0.33	0.05%	99.95%
MERCER	1	0.33	0.05%	100.00%
TOTAL	2060	686.67	100.00%	

*Includes drivers/passengers of passenger cars, station wagons, SUVs, van (8 or less with driver), pick-up and Single-unit Truck with 3 or more axles.*

Top 85th percentile of vehicle occupant fatalities

# Top Counties with 85% of Vehicle Occupant Fatalities 2008 - 2010

APPENDIX B



Includes drivers and passengers of passenger cars, station wagons, SUVs, Van (8 or less with driver), pick-up, and single-unit trucks with 2 axles, 6 tires.



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**APPENDIX C**

**POPULATION BY REGION**  
**for Top 85% Vehicle Occupant Fatality Counties**  
**2010 Census Data**  
**Total Population 5,422,630**

<b>NORTHWEST</b>			
County	Population	Urban/Rural	% Contribution
BUCHANAN	89,201	Urban	
NODAWAY	23,370	Rural	
ANDREW	17,291	Rural	
GRUNDY	10,261	Rural	
<b>TOTAL</b>			<b>2.58%</b>

<b>NORTHEAST</b>			
County	Population	Region	% Contribution
LINCOLN	52,566	Urban	
WARREN	32,513	Rural	
MARION	28,781	Rural	
ADAIR	25,607	Rural	
AUDRAIN	25,529	Rural	
MONTGOMERY	12,236	Rural	
<b>TOTAL</b>			<b>3.27%</b>

<b>KANSAS CITY</b>			
County	Population	Region	% Contribution
JACKSON	674,158	Urban	
CLAY	221,939	Urban	
CASS	99,478	Urban	
PLATTE	89,322	Urban	
JOHNSON	52,595	Urban	
PETTIS	42,201	Rural	
LAFAYETTE	33,381	Rural	
RAY	23,494	Rural	
SALINE	23,370	Rural	
<b>TOTAL</b>			<b>23.23%</b>

CENTRAL DISTRICT			
County	Population	Region	% Contribution
BOONE	162,642	Urban	
COLE	75,990	Urban	
PULASKI	52,274	Urban	
PHELPS	45,156	Rural	
CALLAWAY	44,332	Rural	
CAMDEN	44,002	Rural	
LACLEDE	35,571	Rural	
WASHINGTON	25,195	Rural	
MILLER	24,748	Rural	
CRAWFORD	24,696	Rural	
MORGAN	20,565	Rural	
DENT	15,657	Rural	
<b>TOTAL</b>			<b>10.53%</b>

ST. LOUIS			
County	Population	Region	% Contribution
ST. LOUIS	998,954	Urban	
ST. CHARLES	360,485	Urban	
ST. LOUIS CITY	319,294	Urban	
JEFFERSON	218,733	Urban	
FRANKLIN	101,492	Urban	
<b>TOTAL</b>			<b>36.86%</b>

SOUTHWEST			
County	Population	Region	% Contribution
GREENE	275,174	Urban	
JASPER	117,404	Urban	
CHRISTIAN	77,422	Urban	
NEWTON	58,114	Urban	
TANEY	51,675	Urban	
LAWRENCE	38,634	Rural	
WEBSTER	36,202	Rural	
BARRY	35,597	Rural	
STONE	32,202	Rural	
POLK	31,137	Rural	
MCDONALD	23,083	Rural	
HENRY	22,272	Rural	
VERNON	21,159	Rural	
BATES	17,049	Rural	
BARTON	12,402	Rural	
ST. CLAIR	9,805	Rural	
<b>TOTAL</b>			<b>15.85%</b>

SOUTHEAST			
County	Population	Region	% Contribution
CAPE GIRARDEAU	75,674	Urban	
ST. FRANCOIS	65,359	Urban	
BUTLER	42,794	Rural	
HOWELL	40,400	Rural	
SCOTT	39,191	Rural	
DUNKLIN	31,953	Rural	
STODDARD	29,968	Rural	
TEXAS	26,008	Rural	
NEW MADRID	18,956	Rural	
PEMISCOT	18,296	Rural	
RIPLEY	14,100	Rural	
WAYNE	13,521	Rural	
<b>TOTAL</b>			<b>7.68%</b>

Total Population of Top 85% Vehicle  
 Occupant Fatality Counties      5,422,630  
  
 Total State Population              5,988,927



## Appendix D: Site Summary Form

### Statewide Seat Belt Survey

#### Site Summary Form

Observer: \_\_\_\_\_ County: \_\_\_\_\_

Date: \_\_\_\_\_ Time: Start \_\_\_\_\_ End \_\_\_\_\_

Road Condition:    ☐    ☐    ☐    ☐  
                                  Dry    Wet    Fog    Other: \_\_\_\_\_

Observation Point (be specific): \_\_\_\_\_

Major Distractions: \_\_\_\_\_

PLEASE COMPLETE ALL INFORMATION ABOVE THIS LINE

Road Segment:	County:	Road Type:	Start Time:
<input type="radio"/> 1	<input type="radio"/> 01-Andrew	<input type="radio"/> Rural Interstate (RI)	<input type="radio"/> 7:00 AM
<input type="radio"/> 2	<input type="radio"/> 02-Audrain	<input type="radio"/> Rural Freeway/Expressway (RF/E)	<input type="radio"/> 8:00 AM
<input type="radio"/> 3	<input type="radio"/> 03-Boone	<input type="radio"/> Rural Arterial (RA)	<input type="radio"/> 9:00 AM
<input type="radio"/> 4	<input type="radio"/> 04-Buchanan	<input type="radio"/> Rural Collector (RC)	<input type="radio"/> 10:00 AM
<input type="radio"/> 5	<input type="radio"/> 05-Callaway	<input type="radio"/> Urban Interstate (UI)	<input type="radio"/> 11:00 AM
<input type="radio"/> 6	<input type="radio"/> 06-Cape Girardeau	<input type="radio"/> Urban Freeway/Expressway (UF/E)	<input type="radio"/> 12:00 PM
<input type="radio"/> 7	<input type="radio"/> 07-Cole	<input type="radio"/> Urban Arterial (UA)	<input type="radio"/> 1:00 PM
<input type="radio"/> 8	<input type="radio"/> 08-Franklin	<input type="radio"/> Urban Collector (UC)	<input type="radio"/> 2:00 PM
<input type="radio"/> 9	<input type="radio"/> 09-Greene		<input type="radio"/> 3:00 PM
<input type="radio"/> 10	<input type="radio"/> 10-Grundy		<input type="radio"/> 4:00 PM
<input type="radio"/> 11	<input type="radio"/> 11-Henry	Traffic Flow:	<input type="radio"/> 5:00 PM
<input type="radio"/> 12	<input type="radio"/> 12-Jackson		
<input type="radio"/> 13	<input type="radio"/> 13-Jasper	<input type="radio"/> North	
<input type="radio"/> 14	<input type="radio"/> 14-Jefferson	<input type="radio"/> East	County:
<input type="radio"/> 15	<input type="radio"/> 15-Johnson	<input type="radio"/> South	
<input type="radio"/> 16	<input type="radio"/> 16-Lafayette	<input type="radio"/> West	<input type="radio"/> Urban
<input type="radio"/> 17	<input type="radio"/> 17-Lawrence		<input type="radio"/> Rural
<input type="radio"/> 18	<input type="radio"/> 18-Lincoln		
<input type="radio"/> 19	<input type="radio"/> 19-Marion		
<input type="radio"/> 20	<input type="radio"/> 20-Montgomery	Day of the Week:	District:
<input type="radio"/> 21	<input type="radio"/> 21-Nodaway		
<input type="radio"/> 22	<input type="radio"/> 22-Pemiscot	<input type="radio"/> Sunday	<input type="radio"/> 01-Northwest
<input type="radio"/> 23	<input type="radio"/> 23-Phelps	<input type="radio"/> Monday	<input type="radio"/> 02-Northeast
<input type="radio"/> 24	<input type="radio"/> 24-Saline	<input type="radio"/> Tuesday	<input type="radio"/> 03-Kansas City
<input type="radio"/> 25	<input type="radio"/> 25-St. Charles	<input type="radio"/> Wednesday	<input type="radio"/> 04-Central
<input type="radio"/> 26	<input type="radio"/> 26-St. Francois	<input type="radio"/> Thursday	<input type="radio"/> 05-St. Louis
<input type="radio"/> 27	<input type="radio"/> 27-St. Louis/City	<input type="radio"/> Friday	<input type="radio"/> 06-Southwest
<input type="radio"/> 28	<input type="radio"/> 28-Stoddard	<input type="radio"/> Saturday	<input type="radio"/> 07-Southeast

## Appendix E: Observational Form

District:	County:	<input type="radio"/>	<input type="radio"/>	0	Road Segment:	<input type="radio"/>	<input type="radio"/>	0	Observer: _____
		<input type="radio"/>	<input type="radio"/>	1		<input type="radio"/>	<input type="radio"/>	1	
<input type="radio"/> 1-NW	_____	<input type="radio"/>	<input type="radio"/>	2	_____	<input type="radio"/>	<input type="radio"/>	2	
<input type="radio"/> 2-NE		<input type="radio"/>	<input type="radio"/>	3		<input type="radio"/>	<input type="radio"/>	3	
<input type="radio"/> 3-KC		<input type="radio"/>	<input type="radio"/>	4		<input type="radio"/>	<input type="radio"/>	4	
<input type="radio"/> 4-Central		<input type="radio"/>	<input type="radio"/>	5		<input type="radio"/>	<input type="radio"/>	5	
<input type="radio"/> 5-St. Louis		<input type="radio"/>	<input type="radio"/>	6		<input type="radio"/>	<input type="radio"/>	6	
<input type="radio"/> 6-SW		<input type="radio"/>	<input type="radio"/>	7		<input type="radio"/>	<input type="radio"/>	7	Page: _____ of _____
<input type="radio"/> 7-SE		<input type="radio"/>	<input type="radio"/>	8		<input type="radio"/>	<input type="radio"/>	8	
		<input type="radio"/>	<input type="radio"/>	9		<input type="radio"/>	<input type="radio"/>	9	

	Vehicle Type				Driver Belted			Driver Gender		Passenger Belted		
	Car	Truck	Minivan/ Van	SUV/ Crossover	Yes	No	Un- known	M	F	Yes	No	Un- known
1.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>